

What is Claimed is:

1. A liquid crystal display device comprising:
a fluorescent light tube as a light source, and
a liquid crystal display panel for displaying images by controlling transmission of light
from said fluorescent light tube;
said liquid crystal display panel including:
a color filter substrate having color filter layers of red, green and blue,
an opposing substrate opposed to said color filter substrate, and
a liquid crystal material being filled between said opposing substrate and said color
filter substrate;
wherein said fluorescent light tube includes a phosphor having luminous efficiency
equivalent to 80% and below in comparison with $\text{LaPO}_4\text{:Ce,Tb}$ as a green phosphor,
a maximum peak of a radiant energy spectrum of said phosphor is included within a
spectral transmissive region of said green color filter layer,
said radiant energy spectrum of said phosphor increases virtually continuously
concerning points other than said maximum peak within a wavelength region where spectral
transmissive regions of said blue and said green color filter layers overlap, and
said fluorescent light tube and said color filter layers have a relation such that a color
reproduction region of light emitted from said fluorescent light tube through said color filter
layers has an NTSC ratio of 85% or higher.

2. The liquid crystal display device according to claim 1, wherein said radiant energy
spectrum of said green phosphor decreases virtually continuously concerning points other than
said maximum peak within a wavelength region where spectral transmissive regions of said

4 green color filter layer and said red color filter layer overlap.

1 3. The liquid crystal display device according to claim 1, wherein a wavelength of said
2 maximum peak of the radiant energy spectrum of said green phosphor is included within a
3 wavelength region having transmittance of 90% or higher of maximum transmittance of said
4 green color filter layer.

1 4. The liquid crystal display device according to claim 1,
2 wherein maximum transmittance of light of said green color filter layer is 55% or
3 higher, and
4 maximum transmittance of light of said blue color filter layer is 40% or higher.

1 5. A liquid crystal display device comprising a backlight unit and a liquid crystal display
2 panel for displaying images by controlling transmission of light from said backlight unit,
3 wherein said liquid crystal display panel includes:
4 a color filter substrate having color filter layers of red, green and blue,
5 an opposing substrate that opposes to said color filter substrate, and
6 a liquid crystal material being filled between said opposing substrate and said color
7 filter substrate; and
8 said backlight unit includes:
9 a plurality of cold cathode tubes being disposed on a back surface of said liquid crystal
10 display panel and having any one of $\text{Zn}_2\text{SiO}_4\text{:Mn}$ and $3(\text{Ba,Mg,Eu,Mn})0.8\text{Al}_2\text{O}_3$ as a green
11 phosphor, and
12 a diffusion plate being disposed between said plurality of cold cathode tubes and said
13 liquid crystal display panel, said diffusion plate being for diffusing light from said plurality of

cold cathode tubes.

1 6. The liquid crystal display device according to claim 5, wherein said plurality of cold
2 cathode tubes and said color filter layers have a relation in that a color reproduction region of
3 light emitted from said plurality of cold cathode tubes through said color filter layers has an
4 NTSC ratio of 85% or higher.

1 7. The liquid crystal display device according to claim 1, wherein said radiant energy
2 spectrum of said green phosphor has a value equivalent to 20% or lower of a maximum peak
3 value of a radiant energy spectrum of a blue phosphor being coated inside said fluorescent tube
4 at a wavelength where spectral transmittance curves of said blue and said green color filter
5 layers intersect.

1 8. The liquid crystal display device according to claim 7, wherein a wavelength of said
2 maximum peak of the radiant energy spectrum of said green phosphor is included within a
3 wavelength region having transmittance of 90% or higher of maximum transmittance of said
4 green color filter layer.

1 9. A display device comprising:

2 a tri-phosphor fluorescent light tube including three kinds of phosphors respectively
3 radiating blue, green and red light, said tri-phosphor fluorescent light tube having luminous
4 efficiency equivalent to 90% or lower of luminous efficiency of a tri-phosphor fluorescent light
5 tube including $\text{BaMg}_2\text{Al}_{16}\text{O}_{27}:\text{Eu}$, $\text{LaPO}_4:\text{Ce,Tb}$ and $\text{Y}_2\text{O}_3:\text{Eu}$ as phosphors thereof.

6 optical elements for controlling transmission of light from said tri-phosphor
7 fluorescent light tube, and

8 a substrate including color filter layers of red, green and blue;

9 wherein a radiant energy of said tri-phospher fluorescent light tube is equivalent to
10 50% or lower of a maximum peak of a radiant energy of said blue phosphor at a wavelength
11 where spectral transmittance curves of said blue and said green color filter layers intersect, and

12 said tri-phospher fluorescent light tube and said color filter layers have a relation such
13 that a color reproduction region of light emitted from said tri-phospher fluorescent light tube
14 through said color filter layers has an NTSC ratio of 85% or higher.

1 10. The display device according to claim 9, wherein said fluorescent light tube includes
2 any one of $\text{Zn}_2\text{SiO}_4\text{:Mn}$ and $3(\text{Ba,Mg,Eu,Mn})0.8\text{Al}_2\text{O}_3$ as a green phosphor.

1 11. The display device according to claim 10, wherein said color reproduction region of
2 the light emitted via said color filter layers has an NTSC ratio of 100% or higher.

1 12. The display device according to claim 10, wherein a wavelength of said maximum
2 peak of the radiant energy spectrum of said green phosphor is included within a wavelength
3 region having transmittance of 90% or higher of maximum transmittance of said green color
4 filter layer.

1 13. The display device according to claim 10,
2 wherein maximum transmittance of light of said green color filter layer is 55% or
3 higher, and
4 maximum transmittance of light of said blue color filter layer is 40% or higher.

1 14. The display device according to claim 10.
2 wherein said display device includes a liquid crystal display panel having:
3 a first transparent substrate,
4 a second transparent substrate, and
5 a liquid crystal material as said optical elements, said liquid crystal material being
6 filled between said first transparent substrate and said second transparent substrate; and
7 said liquid crystal display panel includes:
8 said color filter layers, and
9 a plurality of pixel electrodes for applying electric fields to said liquid crystal material,
10 said plurality of pixel electrodes being transparent electrodes that are arranged in a matrix
11 layout with said color filter layers.